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**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.



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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/505,438  
Filing Date: August 24, 2004  
Appellant(s): ASANO ET AL.

**MAILED**  
SEP 25 2007  
**GROUP 2800**

Barry E. Bretschneider  
Registration No. 28,055  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed January 31, 2007 appealing from the Office action mailed September 18, 2006.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

Although the Examiner agree to the statement of the summary of claimed subject matter, however, the substance of the summary regarding the overlapping of the first and second high concentration impurity regions, in which the Appellant states: "This overlapping of the inner side surfaces OS of the first and second high concentration impurity regions 201 and 202 is shown in FIGS. 1, 2A, 4A, 12 and 16B, for example", is strongly disagree by the Examiner.

The detail of which will be presented in the Response to Argument.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

2002/0047177

Asano et al.

4-2002

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

***Claim Rejections - 35 USC § 112***

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

1. Claims 20-38 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a written description of the claim limitation “the inner side surface of the first high concentration region overlaps at least partially with an inner side surface of the second high concentration region so that the portion of the insulating region is disposed between the inner side surfaces” in the application as filed.

Applicant asserts that the support for such limitation is disclosed at page 11, lines 12-25 and Fig. 5.

However, Fig. 5 as well as the written text shows that the first and second high concentration 201 and 202 do not overlap, not even partially.

2. Claims 32, 37 and 39-42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

With respect to claims 32 and 37, there does not appear to be a written description of the claim limitation “a distance between the outer side surface of the first high concentration impurity region (claim 32) or between a side surface of the branch portion (claim 37) and an edge of the insulating region closest to the first high concentration impurity region is 10  $\mu$ m or larger.” in the application as filed.

As seen in Fig. 23A, the outer side surface of the first high concentration impurity region has been defined in claim 20 to be the side other than the one that faces the second impurity region. Claim 20 also defined that the first impurity region is formed in an insulating region.

Therefore, the distance between the side surface of the branch portion or the outer side surface of the first high concentration impurity region and the edge of the insulating region closest to the first high concentration impurity region is the interface between them, thus, 0  $\mu$ m not 10  $\mu$ m or larger.

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With respect to claims 39-42, there does not appear to be a written description of the claim limitation “a distance in the direction of the flow (claims 39 and 40) or normal to the flow (claims 41 and 42) of electric current between the first high concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10  $\mu$ m or larger.” in the application as filed.

The flow of electric current is from the first high concentration impurity region to the second high concentration impurity region.

The term “direction normal to the flow” means perpendicular to the flow or from the top of the insulating region into the bottom.

The term “between the *first* high concentration impurity region and an **edge** of the insulating region *closest to the first* high concentration impurity region” is the interface between the two, which is 0  $\mu$ m, since the interface has no thickness.

Applicant must remove or provide support for the new matter in response to the Office Action.

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 32, 37 and 39-42 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

With respect to claims 32 and 37, both claims recite similar subject matter: wherein the distance between outer side surface of the first high concentration impurity region (claim 32) or a

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side surface of the branch portion (claim 37) and an edge of the insulating region closest to the branch portion is 10  $\mu\text{m}$  or larger (both claims).

As discussed above, the interface has no thickness.

Secondly, the claimed limitation is not understood.

With respect to claims 39-42, claims 39-42 recite the limitation: "a distance in the direction of the flow or normal to the flow, of electric current between the first high concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10  $\mu\text{m}$  or larger".

The limitation is not understood, thus indefinite.

The merits of these claims (37 and 39-42) therefore could not be determined.

4. Claims 20-38 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 20 recites: the inner side surface of the first high concentration region **overlaps at least partially** with an inner side surface of the second high concentration region **so that the portion of the insulating region is disposed between the inner side surfaces**.

If two regions are deemed overlap then nothing is between them. Therefore, the claims are indefinite.

***Claim Rejections - 35 USC § 102***

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 20, 24-31, 34, 36 and 38 are rejected under 35 U.S.C. 102(b) as being anticipated by Asano et al. (U.S. Pub. No. 2002/0047177) as previously applied.

As best understood by the examiner, Asano teaches a protecting element as claimed including:

a first high concentration impurity region (161) formed in an insulating region (145) of a substrate (151) and connected to a first terminal (162) of an element formed in the substrate; and

a second high concentration impurity region (160) formed in the insulating region (145) and connected to a second terminal (170) of the element, the first (161) and second (160) high concentration impurity regions facing each other with a portion of the insulating region (145) disposed therebetween,

wherein a width of the first high concentration impurity region (161) is configured so that upon discharging of electrostatic energy applied between the first (162) and second (170) terminals a current path is formed in the insulating region (145) from an outer side surface of the first high concentration impurity region (161) to the second high concentration impurity region (160), the outer side surface of the first high concentration impurity region (161) being opposite from an inner side surface of the first high concentration impurity region that faces the portion of the insulating region (145). (See Figs. 3, 18A-C).



Regarding the functional limitation of: “the width of the high concentration impurity region is configured so that upon discharging of electrostatic energy applied between the first and second terminals a current path is formed in the insulating region from an outer side surface of the first high concentration impurity region to the second high concentration impurity region”, since the protecting element of Asano comprises the exact same elements as that of the claim, thus the element of Asano should inherently function the same way.

With respect to claim 22, the width of the second high concentration impurity region (160) of Asano is configured so that upon the discharging of the electrostatic energy applied between the first (162) and second (170) terminals the current path from the outer side surface of the first high concentration impurity region (161) inherently reaches an outer side surface of the second high concentration impurity region (160), the outer side surface of the second high concentration impurity region (160) being opposite from an inner side surface of the second high concentration impurity region that faces the portion of the insulating region (145). (See Figs. 3, 18A-C).

With respect to claim 24, the separation of the first (161) and second (160) high concentration impurity regions of Asano is 10  $\mu\text{m}$  or smaller.

With respect to claim 25, the separation of the first (161) and second (160) high concentration impurity regions of Asano is 4  $\mu\text{m}$  or larger.

With respect to claim 26, impurity concentration of the insulating region (145) of Asano is  $1 \times 10^{14} \text{ cm}^{-3}$  or lower.

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With respect to claim 27, volume resistivity of the insulating region (145) of Asano is  $1 \times 10^3 \Omega \cdot \text{cm}$  or higher.

With respect to claim 28, the insulating region (145) of Asano is configured to provide an additional current path upon the discharging between the inner side surface of the first high concentration impurity region (161) and an inner side surface of the second high concentration impurity region (160) and between bottom surfaces of the first (161) and second (160) high concentration impurity regions.

With respect to claim 29, the first high concentration impurity region (161) of Asano comprises a branch portion that does not face the second high concentration impurity region (160) and is configured to provide upon the discharging an additional current path in the insulating region (145) between the branch portion and the second high concentration impurity region (160). (See Figs. 3, 18C).

With respect to claim 30, the current path of Asano inherently has a higher conductivity modulation than the additional current path.

With respect to claim 31, a current running through the current path of Asano upon the discharging is inherently greater than a current running through the additional current path upon the discharging.

With respect to claim 34, the current path of Asano inherently expands when the electrostatic energy applied between the first (162) and second (170) terminals becomes larger.

With respect to claim 36, the additional current path of Asano inherently has a higher conductivity modulation than the current path.

With respect to claim 38, the additional current path of Asano inherently expands when the electrostatic energy applied between the first and second terminals becomes larger.

***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claims 21, 23, 33 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Asano '177.

With respect to claims 21 and 23, Asano teaches a protecting device as described in claim 20 and 22 above, thus, Asano is shown to teach all the features of the claim with the exception of the specific width of the first (161) and second (160) high concentration impurity region.

Note that the claimed range does not appear to be critical.

However, Asano further teaches that the first (161) and second (160) high concentration impurity region can be made smaller such that the insulating region 145 is located directly under the pad electrode 170 and wiring layer 162 consequently, the leakage of the high frequency signal applied to the pad to the wiring layer through the insulating region 145 is prevented.

Note that the specification contains no disclosure of either the *critical nature of the claimed width of the first and second impurity region* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another

variable recited in a claim, the Applicant must show that the chosen dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Within purview of one having ordinary skill in the art, it would have been obvious to determine the optimum width of the impurity regions to prevent leakage of high frequency signal applied to the electrodes. See *In re Aller*, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine

Furthermore, it would have been obvious to one having ordinary skill in the art at the time of invention to reducing the size of the impurity regions of Asano since such a modification would have involved a mere change in the size of a component. A change in size is generally recognized as being within the level of ordinary skill in the art. *In re Rose*, 105 USPQ 237 (CCPA 1955).

With respect to claim 33, Asano is shown to teach all the features of the claim with the exception of explicitly disclosing the thickness as claimed. Note that, the claimed thickness range of 20  $\mu\text{m}$  or larger appears to be common.

However, Asano teaches that a buffer layer of 6000 Å thickness has already prevent leakage.

Note that the specification contains no disclosure of either the *critical nature of the claimed thickness of 20  $\mu\text{m}$  or larger of the insulating portion under the impurity region* of any unexpected results arising therefrom. Where patentability is aid to based upon particular chosen dimension or upon another variable recited in a claim, the Applicant must show that the chosen

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dimension are critical. *In re Woodruff*, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

Therefore, it would have been obvious to one having ordinary skill in the art at the time of invention to form the protecting device of Asano on a thicker insulating layer to prevent leakage.

With respect to claim 35, the capacitance between the first (161) and second (160) high concentration impurity regions of Asano is proportional to the volume resistivity of the insulating region between them. Since the insulating region (145) of Asano has a volume resistivity within the claimed range  $1 \times 10^3 \Omega \cdot \text{cm}$  or higher, thus, meets the capacitance of 40 fF or smaller, and the element of Asano inherently has a strength against electrostatic discharge at least 10 times as large as that of the element *without* the first and second high concentration impurity regions.

#### **(10) Response to Argument**

##### **A. Claims 20-38 Rejected Under 35 U.S.C. 112, First Paragraph**

Appellant asserts that the Examiner failed to read the disclosure of the application properly. The Appellant further cites Fig. 12 for support of the claimed limitation: “the inner surface of the first high concentration region overlaps at least partially with an inner side surface of the second high concentration region so that the portion of the insulating region is disposed between the inner side surface”.

However, reviewing the entire application, including Fig. 12 and all of the figures and the supporting text, one would have concluded that no such overlap ever occurred.

From Fig. 5A, the plane view of the device, the shaded area, numerals 201 and 202, represent the first and second high concentration regions, respectively. There is no overlap from this view, not even partially. The same are repeated in other drawings as well.

From Fig. 5B, the side view of the same device, the two high concentration regions 201 and 202 are clearly separated. There is no hind of overlap or showing the two regions ever overlap. The term "OS" is defined in the specification page 19, lines ...as: "the side surface at the side at which the two regions oppose each other shall be referred to as the opposing surface OS". From Fig. 1, again, the two regions 201 and 202 are clearly separated by the insulation region 203.

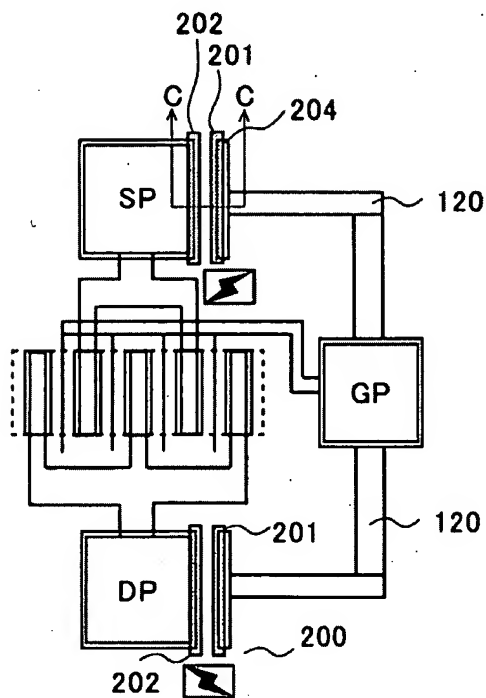


FIG.5A

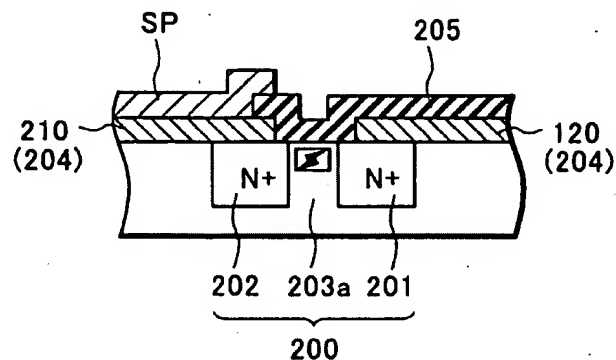
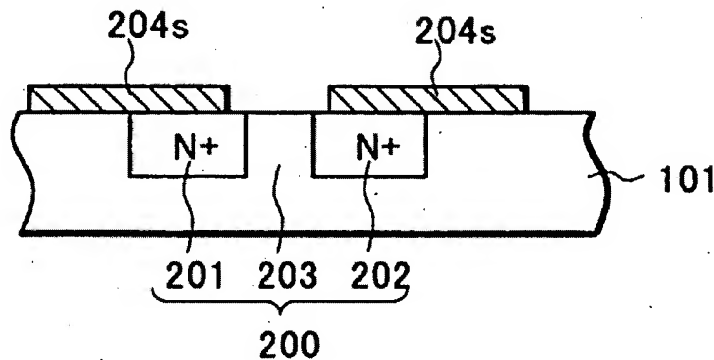


FIG.5B

In section V. Summary of Claimed Subject Matter, the Appellant states: “the first and second high concentration impurity regions 201 and 202 face each other with a portion of the insulating region 203 is disposed between them, as shown in Fig. 2A”.



**FIG. 2A**

Again, Fig. 2A, as shown above, does not show any overlap. Moreover, since the region 203 is between them, then the Appellant on his own word already contradicting the overlap.

Clearly, the Appellant could not produce any drawing nor text that support the new matters.

The rejection should be maintained.

**B. Claims 32, 37 and 39-42 Rejected Under 35 U.S.C 112, First Paragraph**

With respect to claims 32, the independent claim 20, line 2, recites: “a first high concentration region formed in an insulating region of a substrate”.

By being formed “in” the insulating region, both or all sides of the first high concentration region (201) contacts the insulating region (203).

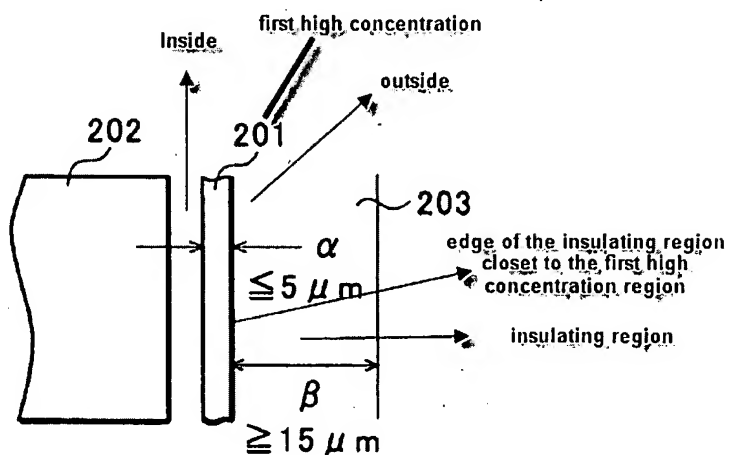
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Claim 32 recites: wherein a *distance* between the *outer side surface* of the first high concentration impurity region and an edge of the insulating region closest to the first high concentration impurity region is 10  $\mu\text{m}$  or larger. (Emphasis added).

As illustrates in Fig. 21B below, the outer side surface of the first high concentration impurity region 201 contacts the insulating region 203, therefore, the edge is the interface between the insulating region 203 and impurity region 201, thus there is no distance between them since they are intimately contacted each other or the distance is zero.

The claims have been given their broadest interpretation in light of the specification.

FIG.21B



The similar also applies to claims 37 and 39-42.

The rejection should be maintained.

**C. Claims 32, 37 and 39-42 Rejected Under 35 U.S.C 112, Second Paragraph**



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The claimed term clearly lacking antecedent basis in the specification or the independent claim and claiming an “interface” region between the first high concentration impurity region and the closet insulating region to have a thickness of “10  $\mu\text{m}$  or larger” is indefinite, since it is well known that the “interface” between two layers has no thickness.

The rejection should be maintained.

**D. Claims 20-38 Rejected Under 35 U.S.C 112, Second Paragraph**

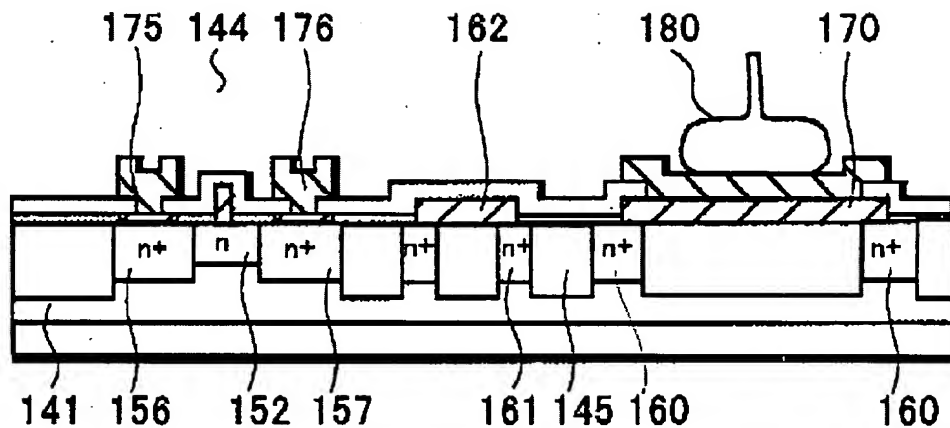
As discussed above, the claimed term “overlaps” clearly lacking antecedent basis in the specification is indefinite, since it is well known that the presence of the insulating region 203 between inner side surface of the two impurity region 201 and 202, thus, the two regions 201 and 202 can not and should not be overlapped.

The rejection should be maintained.

**E. Claims 20, 24-31, 34, 36 and 38 Are Rejected Under 35 U.S.C 102(b) For Being Anticipated By Asano (US Pub. No. 2002/0047177)**

As shown in the rejection above, there is an insulating region (145) between the first (161) and second (160) high concentration impurity regions. Since claim 20, claiming exactly the same setup and recites the setup as “overlaps”, then the two impurity regions of Asano can be called “overlaps” as well.

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**FIG.18B**

The rejection should be maintained.

**D. Claims 21, 23, 33 and 35 Are Rejected Under 35 U.S.C 1032(a) For Being Obvious Over Asano (US Pub. No. 2002/0047177)**

The Appellant asserts Asano does not disclose the feature on which this obviousness rejection relies.

Since claim 20 are anticipated by Asano as discussed above, the dependent claims 21, 23, 33 and 35 are obvious over the same reference.

The rejection should be maintained.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

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Respectfully submitted,

Anh D. Mai, Examiner of Record *A.D.M.*

Conferees:

Ricky L. Mack, SPE. *RLM*

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